S. Z. DE FERRANTI.

SPINNING, DOUBLING, AND TWISTING MACHINE.

APPLICATION FILED APR. 24, 1909.

986,699.

Patented Mar. 14, 1911.

2 SHEETS—SHEET 1.

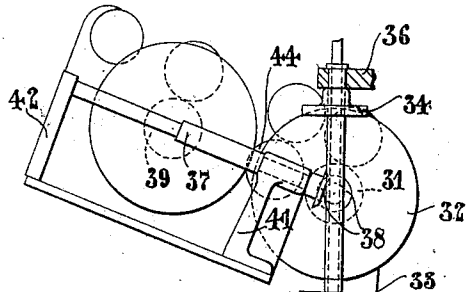
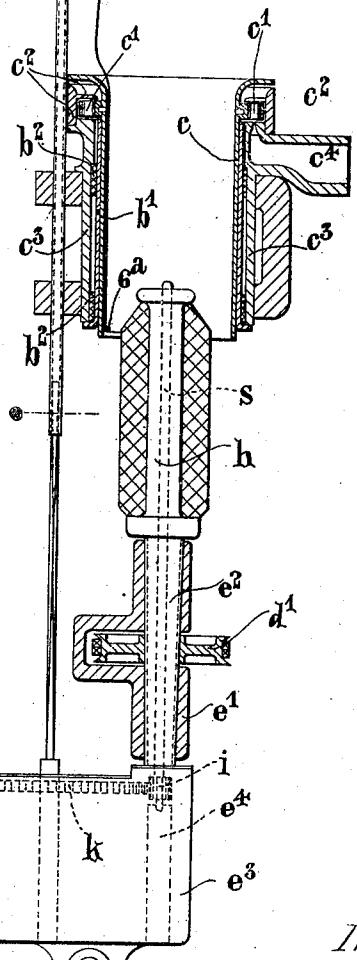


Fig. 1.



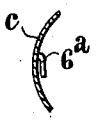


Fig. 1a.

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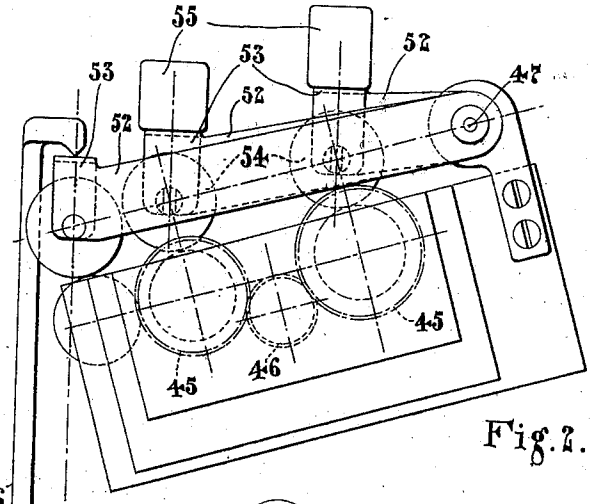

Fig. 2.

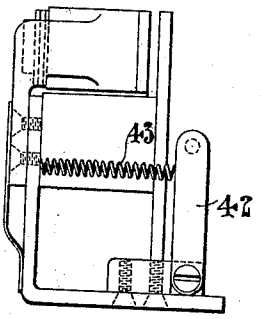

Fig. 4.

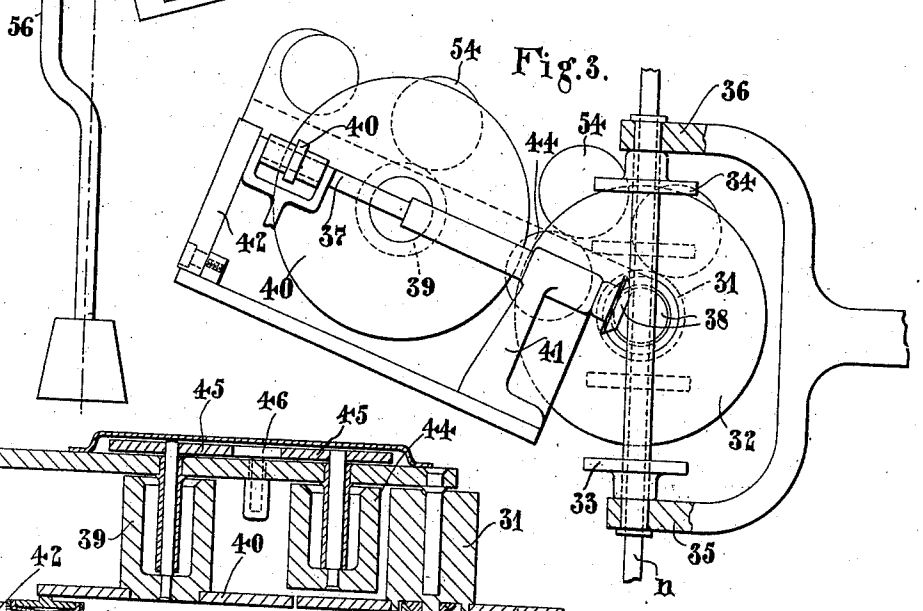

Fig. 3.

Fig. 5.

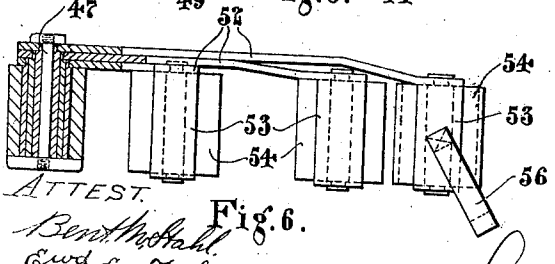

Fig. 6.

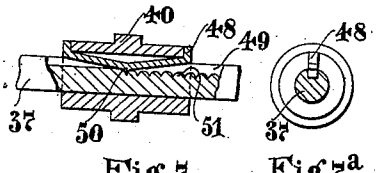

Fig. 7. Fig. 7a.

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UNITED STATES PATENT OFFICE.

SEBASTIAN ZIANI DE FERRANTI, OF GRINDLEFORD, NEAR SHEFFIELD, ENGLAND.

SPINNING, DOUBLING, AND TWISTING MACHINE.

986,699. Specification of Letters Patent. **Patented Mar. 14, 1911.**

Original application filed May 12, 1905, Serial No. 260,120. Divided and this application filed April 24, 1909. Serial No. 491,896.

To all whom it may concern:

Be it known that I, SEBASTIAN ZIANI DE FERRANTI, a subject of the King of Great Britain and Ireland, and residing at Grindleford, near Sheffield, in the county of Derby, England, have invented certain new and useful Improvements in and Relating to Spinning, Doubling, and Twisting Machines, of which the following is a specification.

The invention relates to machines for spinning, doubling twisting and the like (operations referred to generically hereinafter as "twisting") and in particular to the transfer rolls used in such machines whether for feeding material to, or drawing off material from, the means provided for imparting twist thereto, such means as is well known taking different forms *e. g.* spindle, cup ring flier or otherwise to suit the requirements of the particular design.

For simplicity in the following specification and claims, I shall at times refer to the material under treatment as "thread." I shall now describe by way of example a specific form of my invention and subsequently point out the features of novelty which I desire to protect in the claims.

Referring to the accompanying drawings Figure 1 shows a general view of the improved transfer rolls applied to a spinning device having a leading and a lagging part. Fig. 1ª being a corresponding part plan of a detail of the ring flier showing the thread engaging hook. Fig. 2 shows an elevation of one side of the rolls on an enlarged scale. Fig. 3 being an elevation of the other side of the rolls. Fig. 4 shows a corresponding end elevation. Fig. 5 shows a sectional plan, the plane of the section passing through the axis of the lower roll. Fig. 6 shows a plan view of the upper rolls, partly in section, while Figs. 7 and 7ª show a detail view of a device for defining the position of one of the friction gear wheels.

The drawings are to a certain extent of a diagrammatic nature while where desirable the same reference symbols are used to denote similar parts in the different figures.

Referring now to Fig. 1 the thread is fed from the feed rolls to the hook 6^a in the ring flier c and so to the bobbin h on which it is wound, the ring flier thus forming the leading part and the spindle f on which the bobbin is mounted the lagging part. As regards the leading part or ring flier c a mounting is provided for the same which consists in a sleeve b' truly turned and having a total clearance of the order of three ten-thousandths of an inch so that the film of air between the surfaces of the ring flier c and the sleeve b' acts as the lubricant. The sleeve b' is in turn mounted in a socket or the like c^3 fitting into any convenient fixed part of the frame work of the machine, rubber rings b^2 being inserted between the sleeve b' and the socket c^3. A turbine c' is mounted on the upper part of the ring flier and is supplied with working fluid by way of the passage c^4 formed in the socket part c^3. A ring c^2 fits over the turbine and thus acts as a shield to prevent or minimize the fanning action of the blades, certain parts of the shield being cut away as indicated on the left hand side of Fig. 1 to allow the exhaust from the turbine to escape and to impinge upon the outwardly turned flange of the ring flier itself. The exhaust gases thus to a certain extent counteract the dead weight of the ring flier. As regards the lagging part in the example shown this consists of a spindle s on which the bobbin h is mounted and having an enlarged part e^2 which fits accurately in a stationary part e' so as to form an air bearing as before. The lower part of the spindle is carried in a footstep e^4 mounted on a rail e^3 which is given a reciprocating motion by any of the well known mechanism for the purpose, such transverse motion forming no part of the present invention.

A turbine d' is shown mounted on the enlarged part e^2 of the spindle, the object of this turbine being to reduce the tension on the thread so that very fine counts may be spun. On the lower part of the spindle a gear wheel i is provided meshing with a second wheel k the spindle n of which transmits the motion of the lagging part to the rolls. Motion is transmitted to the first lower draw roll 31 by means of a friction disk 32 gearing with small friction wheels 33 and 34 splined on the shaft n. The small friction wheels 33 and 34 may be rigidly mounted on the striking levers 35 and 36 which are used for actuating the wheels 33 and 34 so that their position, with respect to the center of the friction disk 32, may be varied or they may be completely removed from contact therewith as desired. It

should be understood that when one of the small friction wheels say, 33 is in contact with the disk 32 the other wheel 34 is removed from contact therewith, so that assuming the spindle *n* to rotate constantly in the one direction, the direction of the disk 32 when in contact with the wheel 33 is contrary to that when it is in contact with the wheel 34. A countershaft 37 is connected by bevel gearing 38 to the lower first draw roll 31, transmitting motion to the draw roll 39 by variable friction gears 40. This countershaft 37 is mounted on bearings 41 and 42, the bearing 42 having a spring connection 43 in order to insure that the necessary frictional contact is maintained between the variable gears 40. The roll 39 is geared to the roll 44 by spur gearing 45 through an idle wheel 46. The upper rolls are all carried by swing arms 52 rotatable about a common axis 47 as seen in Fig. 6, one of the objects of this form of mounting being to facilitate the insertion of the material.

Figs. 7 and 7ª show a detail of a device by which the small friction wheels used may be splined on to a shaft as described and at the same time have their position longitudinally of the shaft defined in a number of predetermined positions. A C spring (see Figs. 7 and 7ª) is rigidly attached to the small friction wheel and slides in a slot 49 cut parallel to the longitudinal axis of the shaft. On the bottom of the spring the projection is situated which is adapted to engage with teeth 51 formed in the bottom of the slots 49. It will be obvious that the C spring 48 will cause the small friction wheel to be retained in position on the shaft with a sufficient force, while at the same time not preventing it from being moved with relation thereto by the striking lever or the like.

In cases where it is desirable to increase the pressure between the rolls, I provide weights of lead or other suitable material which I dispose on the upper rolls in any convenient manner. Thus referring particularly to Figs. 2 and 6 the pivoted swing arms 52 each carry a bridge piece 53, the ends of which remote from the swing arm, are turned down and slotted so as to fit over checks (see Fig. 6) in the axial portion of the rolls 54 corresponding slots being provided in the arms themselves. On two of these bridge pieces, weights 55 are fixed while on the third a hanger 56 is arranged to carry a suitable weight at its extremity.

It will be seen that with my improved arrangement of transfer rolls, the amount of draw may be varied by adjusting the position of the friction wheel 40, while the degree of twist *i. e.* the number of twists per unit length imparted to the material may be independently varied by adjusting the position of the wheels 33 and 34 as the case may be, both these adjustments being possible while the machine is running. Moreover it will be evident that by turning back two of the upper rolls 54 the drawing rolls are rendered inoperative while at the same time the direction of rotation of the rolls 31 and 54 may be reversed so that when required they may act as draw off rolls instead of feed rolls.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:—

1. In combination in a twisting machine a rotatable twisting element, a plurality of rolls actuated by said element, a second plurality of rolls co-acting therewith, together with a plurality of independently movable members upon each of which one of said second mentioned rolls is overhung.

2. In combination in a twisting machine a rotatable twisting element, a plurality of rolls actuated by said element, a second plurality of rolls co-acting therewith, together with a plurality of co-axially mounted independently movable members, upon each of which one of said second mentioned rolls is overhung.

3. In combination in a twisting machine a rotatable twisting element, a plurality of rolls actuated by said element, means for altering the draw of the material during running of the machine, together with means for altering the twist during the running of the machine.

4. In combination, in a twisting machine, a rotatable twisting element; a thread-transfer roll driven therefrom; a second thread-transfer roll geared to said first-mentioned roll, means for changing the velocity ratio between said twisting element and said first-mentioned roll and other means for changing the velocity ratio between said first and second-mentioned rolls, both said means being operable during running of the machine.

5. In combination in a twisting machine, a plurality of draw rolls; a friction disk mounted on one of said rolls and a gear mounted on another of said rolls; a shaft running substantially parallel to said disk and carrying at one end a friction wheel in operative engagement with said disk and at the other end a gear engaging with said first-mentioned gear.

6. In combination in a twisting machine, a rotatable twisting element; a plurality of pairs of thread-transferring rolls and a driving connection between said element and said pairs of rolls, said driving connection including a reversing gear together with movable means for separating the individual rolls of certain of said pairs to render the same inoperative.

7. In combination in a twisting machine, a rotatable twisting element, a motor

mounted thereon; a plurality of pairs of thread-transferring rolls and a driving connection between said element and said pairs of rolls, said driving connection including a reversing gear together with movable means for separating the individual rolls of certain pairs to render the same inoperative.

8. In combination in a twisting machine a rotatable twisting element, thread-transfer rolls driven by said element, friction gearing for altering the velocity ratio of said twisting element and said transfer rolls, together with means co-axial with one of the members of said friction gear for actuating certain of said rolls at a speed which differs from that of the friction gearing.

In testimony whereof, I affix my signature in presence of two witnesses.

SEBASTIAN ZIANI DE FERRANTI.

Witnesses:

ALBERT HALL,

WILLIAM DUNCAN DAVIDSON.